

**Danielle Changala** graduated cum laude from the University of California, San Diego, with a double major in Political Science and Psychology, and completed her Masters in Environmental Law and Policy in 2010 while earning the Certificate in Energy Law. She has interned with New Generation Energy, a non-profit renewable investment firm focusing on extending capital from private investors to community-level renewable energy projects, and with the Conservation Law Foundation in Boston, where she worked in the Clean Energy and Climate Change program area.

**Michael Dworkin** has been a utility regulator, an appellate litigator and management partner in a telecommunications engineering firm. He currently is Professor of Law and Director of the Institute for Energy and the Environment at Vermont Law School and on the board of the Vermont Energy Investment Corporation, which manages "Efficiency Vermont." In the past he has been Chairman of the Vermont Public Service Board, a board member of the Electric Power Research Institute and American Council for an Energy Efficient Economy, and a recipient of NARUC's Kilmarx Award for "contributions to clean energy, good government and the environment."

**Jay Apt** is Executive Director of the Carnegie Mellon Electricity Industry Center at Carnegie Mellon University's Tepper School of Business and the CMU Department of Engineering and Public Policy, where he is a Distinguished Service Professor. He received an A.B. in Physics from Harvard College in 1971 and a Ph.D. in Experimental Atomic Physics from the Massachusetts Institute of Technology in 1976. He received the NASA Distinguished Service Medal in 1997 and the Metcalf Lifetime Achievement Award for significant contributions to engineering in 2002.

**Dr. Paulina Jaramillo** has a bachelor's in Civil and Environmental Engineering from Florida International University (2003), as well as a master's and Ph.D. in Civil and Environmental Engineering with an emphasis in green design from Carnegie Mellon University (2004 and 2007, respectively). Her past research has focused on life cycle assessment of energy systems with an emphasis on climate change impacts and mitigation research. As a professor at CMU, she is involved in key multi-disciplinary research projects to better understand the social, economic and environmental implications of energy consumption and the public policy tools that can be used to support sustainable energy development and consumption. She is now the executive director of the RenewElec project.

# Comparative Analysis of Conventional Oil and Gas and Wind Project Decommissioning Regulations on Federal, State, and County Lands

*As the growth of renewable energy continues, it is imperative that adequate funds are secured to successfully decommission projects at the end of their useful life. Additionally, it is important to ensure that regulatory decommissioning obligations do not disproportionately burden any generation resource.*

*Danielle Changala, Michael Dworkin, Jay Apt and Paulina Jaramillo*

## I. Introduction

In the midst of an unstable geopolitical environment, concerns about global climate change, advancing clean energy technologies, and progressive state and national policies, the interest and need for renewable are at the forefront of the political agenda. In order to accommodate the growth of renewable energy, it is necessary

to develop a policy environment that not only facilitates the integration of renewable energy into the electric grid, but also provides a regulatory system that ensures environmental accountability and a level playing field amongst domestic energy resources. The integration of renewable energy must be done in a manner that not only provides for successful implementation, but

also ensures that the addition of renewable resources will not create additional environmental problems in the wake of a clean energy solution. The decommissioning requirements governing energy generation projects are an imperative component of such a regulatory structure—adequate requirements and funds need to be secured for reclamation and decommissioning costs to ensure that wind projects will not be abandoned without appropriate securities after their useful lifetime. While these environmental assurances are necessary, it is also important to recognize that these assurances must be similarly imposed on all energy resources, so as not to set back or advance any particular resource over another. Fundamentally, resources should be on a level playing field so that selection amongst competing energy resources are not distorted by disproportional regulatory burdens.

A comparative analysis of decommissioning requirements for oil, gas, and other electricity generation resources on federal, state, and county land illustrates what regulations are currently required for particular resources. Furthermore, it demonstrates how decommissioning regulations affect the growth, development, and integration of electricity resources. This article will focus primarily on the decommissioning regulations of conventional oil and gas (O&G) extraction sites and

wind projects.<sup>1</sup> The comparison between O&G extraction sites and wind energy projects provides a particularly appropriate comparison due to similarities in the projects' land use patterns. A comparison of the regulations governing both O&G extraction sites and wind energy projects demonstrates how regulations differ for each of these energy resources and the implications these regulatory structures have on resource development.

## II. Similar Land Use Impacts Between O&G Extraction Site Operations and Wind Projects

O&G extraction sites and wind projects have some similarities in their surface land use patterns. The construction and operation processes of each require the removal of topsoil from the well/turbine site, laying a cement/gravel pad (well pad for O&G, tower foundation for wind turbine), and the construction of roads and access ways for site construction and maintenance.<sup>2</sup> O&G extraction sites also require generators and fuel tanks.<sup>3</sup> Additionally, reserve pits are typically constructed to store or dispose of water for O&G extraction activities.<sup>4</sup> Wind

project developments typically involve such activities as: creating site access; performing site grading; constructing lay-down areas and an on-site road system; removing vegetation; digging for and installing tower foundations; erecting towers and installing nacelles and rotors; installing meteorological towers; constructing electrical substations; and connecting all necessary structures with power-conducting and signal cables.<sup>5</sup> Though technological developments in recent years have supported growing efforts to develop unconventional shale gas resources through the use of horizontal drilling, this article focuses on the land use and reclamation of conventional O&G wells drilled in single pads. Generally, wind farms require surface land use for turbine foundations, roads, and other infrastructure.<sup>6</sup> Although the land required for a wind farm varies based on the specific site and turbine configuration, it is estimated that the direct land effect in Pennsylvania for one wind turbine is approximately 2 acres (Table 1).<sup>7</sup> The land use effect of a conventional natural gas well is estimated to be roughly 7.5 acres per well.<sup>8</sup> This estimate includes land used for well pads, seismic lines,

**Table 1: Direct Land Use Estimates for Wind Turbines and Conventional Gas Wells**

Project Type	Land Use Estimate	Units
Wind turbine	2	Acres/turbine
Single vertical natural gas well	7.5	Acres/well

pipelines, and access roads.<sup>9</sup>

The Bureau of Land Management (BLM) has recognized large wind potential in 11 western states<sup>10</sup>: Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.<sup>11</sup> Similarly, the majority of O&G operations on federal public lands occur in 12 western states: Alaska, Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.<sup>12</sup> Seventy percent of the BLM's O&G permits are for wells in just two western states, Wyoming and New Mexico.<sup>13</sup> Consequently, the majority of O&G operations and wind energy facilities are sited in similar regions of the nation, thereby affecting similar geographically situated environments.

### III. Decommissioning Regulations on Federal Land

#### A. Federal regulatory agency

Under the Federal Land Policy and Management Act (FLPMA) of 1976, the Department of the Interior (DOI) is directed to manage "public lands under principles of multiple use and sustained yield" and is charged "to prevent unnecessary or undue degradation of the lands."<sup>14</sup> From this statutory directive, the DOI authorized the Bureau of Land Management to

implement FLPMA on public lands.<sup>15</sup> As defined by FLPMA, "public lands" are the "lands and interests in lands administered by the Secretary of the Interior, through the BLM."<sup>16</sup> The BLM manages 261 million acres of public surface lands and about 700 million acres of subsurface lands.<sup>17</sup> Additionally, the BLM is responsible for managing federally owned mineral resources in the

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*The Bureau of Land Management has recognized large wind potential in 11 western states.*

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subsurface of both federal public lands and privately owned surface estates, known as "split estates."<sup>18</sup>

BLM administers O&G operations and wind energy project developments on federal public lands. The BLM manages O&G operations through administrative regulations and the development of wind energy resources on federal public lands through right-of-way (ROW) authorizations.<sup>19</sup> The BLM grants ROW authorizations in accordance with FLPMA and the BLM's Wind Energy Development Policy.<sup>20</sup>

#### B. Federal O&G extraction site decommissioning regulations

There are currently approximately 85,000 O&G wells on federal public lands.<sup>21</sup> Generally, as part of the application and planning process for O&G operations, the BLM requires that O&G operators provide a bond to the agency to ensure that there are sufficient funds available to complete the required reclamation and fulfill all other terms and conditions of the lease, including payment of federal royalties.<sup>22</sup> The process of obtaining a lease and permit for O&G operations on federal public lands begins when O&G operators submit an "expression of interest," or pre-sale offer, on land they are interested in leasing.<sup>23</sup> The BLM reviews the submission, and if the agency deems that the land is eligible for lease, it places the land up for a competitive oil and gas lease sale.<sup>24</sup> Once an operator has obtained a lease, the operator must apply for a permit to drill from the BLM prior to preparing or drilling new oil or gas wells.<sup>25</sup> In the application for a drilling permit, the operator must include proof of bond coverage and a surface use plan of operations, which must include a reclamation plan and the process required to accomplish the reclamation plan.<sup>26</sup> Under FLPMA, the BLM generally does not require operators to submit cost estimates for completing reclamation—proof of bond coverage and a reclamation plan are sufficient. However, the

Mineral Leasing Act of 1920, as amended, does require demonstration of an adequate bond or surety before the O&G operators can begin to prepare land for drilling.<sup>27</sup>

The bond required by federal regulations is intended to ensure that the operator complies with the reclamation requirements and all other terms and conditions of the lease.<sup>28</sup> The BLM reviews the application for a permit to drill by: “(1) evaluating the operator’s proposal to ensure that the proposed drilling plan conforms to the land use plan and applicable laws and regulations;” and, “(2) inspects the proposed drilling site to determine if additional site-specific conditions must be addressed before the operator can begin drilling.”<sup>29</sup> Once the BLM approves the proposal, the operator can commence drilling operations. In some states, drilling operations must also be approved by the state.<sup>30</sup>

Under the amended Mineral Leasing Act of 1920, federal regulations require operators to establish bonds or sureties to ensure “complete and timely

reclamation.”<sup>31</sup> The BLM set minimum bond levels to ensure compliance with all legal requirements. The BLM requires bond coverage through one of several mechanisms: individual lease bonds, statewide bonds, or nationwide bonds.<sup>32</sup> These bonds, presented in **Table 2**, were set in 1951 and 1960 and have not been updated or adjusted for inflation since then.<sup>33</sup>

Reclamation of an O&G well can occur at various points in the oil or gas extraction process. *Interim reclamation* is the reclamation of surfaces that were disturbed while preparing a well for drilling, but are no longer needed to safely service the well.<sup>34</sup> For example, an operator might initially require a 3.7-acre area to safely drill a single well, but needs only 1.5 acres to service the well. Consequently, the operator could reclaim the 2.2 acres no longer needed in the drilling operations. Although the BLM does not usually require interim reclamation, it sometimes necessitates such reclamation for specific O&G operations.<sup>35</sup> *Final reclamation* refers to the reclamation process that occurs

when the operator and the BLM determine that the well has no more economic value.<sup>36</sup> The final reclamation plan is the approved plan in the operator’s permit. In an effort to reclaim the well site to match the surrounding natural environment, plans generally include tasks like “plugging wells, removing visual evidence of the well and drill pad, recontouring the affected land, and revegetating the site with native species.”<sup>37</sup>

Once the BLM determines that reclamation has been successful (through a monitoring process which typically takes several years), it will approve a Final Abandonment Notice.<sup>38</sup> If the O&G operations are managed by another agency or if the well is on a split estate owned by a private surface owner, the BLM will obtain consent from that agency or private owner prior to approving the Final Abandonment Notice.<sup>39</sup>

O&G operators are also permitted to delay reclamation processes and allow the well to sit idle.<sup>40</sup> The BLM periodically reviews idle wells to ensure that the operator has legitimate reasons, such as the future

**Table 2: O&G Extraction Site Minimum Bonding Requirements**

Bond Type	Coverage Defined	Set In	Amount
Individual lease bond	Cover all wells operator drills under one lease	1960	\$10,000
Statewide bond	Covers all of an operator’s leases in one state	1951	\$25,000
Nationwide bond	Covers all of an operator’s leases in the US	1951	\$150,000
<i>Other bonds</i>	<b>Unit Operator Bonds:</b> cover all operations conducted on leases within specific unit agreement, determined on case-by-case basis.		
	<b>National Petroleum Reserve in Alaska (NPR-A) Bonds:</b> set in regulation; not less than \$100,000 for single lease, or less than \$300,000 for reserve wide bond.		

Source: GAO-10-245, *Oil and Gas Bonds: Bonding Requirements and BLM Expenditures to Reclaim Orphaned Wells*, 13 (2010); 43 C.F.R. §§ 3104.2, 3.104.3.

economic viability of the well, to delay reclamation.<sup>41</sup> Although operators are required to complete reclamation, some wells become *orphaned wells*. Orphaned wells are wells that have insufficient bonds to cover reclamation and there are no responsible or liable parties to reclaim the wells.<sup>42</sup> In such cases, the BLM uses federal funding to reclaim the well. From 1998 through 2009, the BLM spent approximately \$3.8 million reclaiming 295 orphaned wells.<sup>43</sup>

**I**n total, the BLM holds approximately \$162 million in individual bonds for O&G reclamation processes.<sup>44</sup> However, as noted by BLM officials, these bonds are not generally based on full reclamation costs and would be insufficient if the government were to have to complete reclamation.<sup>45</sup> As mentioned above, most bonding requirements are based on regulatory minimums that are designed only to account for compliance with the terms and conditions of the lease, such as reclaiming disturbed lands, plugging wells, and payment of government royalties. These bonds do not account for site-specific characteristics and reclamation costs that a particular well might require. Furthermore, the regulatory minimums were established in the 1950s and 1960s, leaving the minimum bonding amounts very outdated and not reflective of, or adequate for, actual reclamation costs. When bonds are

insufficient for reclamation and there are no responsible or liable parties, wells are often abandoned.<sup>46</sup> Consequently, the BLM is required to expend federal funds to reclaim the abandoned sites.

### **C. Federal wind project decommissioning regulations**

Wind energy projects on federal public lands are governed by the

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*Wind energy developments on federal lands require two specific bonding requirements.*

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BLM's Wind Energy Development Policy, which provides guidance to process ROW applications for site testing and monitoring facilities for wind energy development on federal public lands.<sup>47</sup> The policy states that all wind energy development project applications are to be processed according to the requirements of FLPMA and the federal regulations regarding ROWs.<sup>48</sup> The BLM has the authority to identify public lands that are applicable for competitive bidding for ROW authorizations.<sup>49</sup> However, the BLM is authorized to do so only if a land use planning decision has specifically identified

an area for competitive wind energy leasing, whether through federal or local land use planning processes.<sup>50</sup>

A FLPMA ROW is the mechanism used to authorize all commercial wind energy development projects on public lands.<sup>51</sup> ROW authorizations approve all onsite access roads, electrical and distribution facilities, and other support facilities, and require an annual rental fee and bonding amount.<sup>52</sup> As of December 2010, there were 29 approved wind development projects on BLM-administered lands with a total installed capacity of 437 MW.<sup>53</sup> The BLM has identified seven additional projects with a total potential capacity of 800 MW.<sup>54</sup>

Wind energy developments on federal lands require two specific bonding requirements. First, a bond is required for site testing and monitoring authorizations to ensure that the developer complies with all terms and conditions of the authorization.<sup>55</sup> This bond is a minimum of \$2,000 per meteorological tower.<sup>56</sup> The second bond is required with the ROW authorization for the wind project development. The *minimum* bond amount for wind energy development on federal public lands is \$10,000 per turbine, considering salvage values of turbines and towers.<sup>57</sup> However, the precise amount of the bond is determined by site-specific and project-specific factors during the ROW authorization process.<sup>58</sup>

**Table 3:** Comparison of Federal Decommissioning Bonding Requirements

Resource	Required By	Minimum Bonding Amount	Set In	Acceptable Forms of Bond
Oil and gas	Bond required in permit to drill.	Independent bond: \$10,000 Statewide bond: \$25,000 Nationwide bond: \$150,000	1960 1951 1951	Surety bond, third-party guarantee from private insurance company, or personal bond accompanied with a cashier's check or Treasury bond.
Wind	ROW authorization	\$10,000/turbine	2010	Cash, cashier's or certified check, Treasury bond, or surety bond.

As **Table 3** demonstrates, the acceptable bond instruments under BLM regulations include cash, cashier's or certified check, negotiable U.S. Treasury bonds, or surety bonds payable to the BLM from the approved list of sureties.<sup>59</sup> The BLM does accept a letter of credit as an acceptable form of a bond.<sup>60</sup> The BLM periodically reviews—at least every five years—all bonds in order to ensure the adequacy of the bonds.<sup>61</sup>

**D**ecommissioning guidelines for a wind energy project must be developed and approved by the BLM.<sup>62</sup> Generally, decommissioning procedures include the dismantling and removal of all towers, turbine generators, transformers, and overhead cables; removal of all underground cables; removal of foundations, buildings, and ancillary equipment; removal of surface road material; and restoration of the roads and turbine sites to a substantially similar condition prior to the construction of the wind facility.<sup>63</sup> Decommissioning procedures include the restoration of the topography of the site, as well as restoring topsoil and reseeded the surface to restore the natural

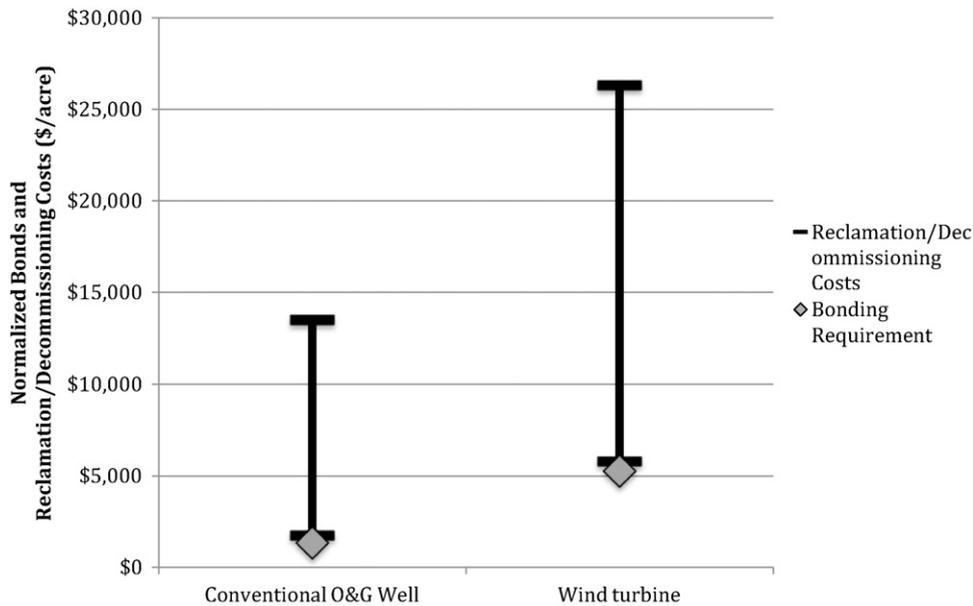
resources.<sup>64</sup> The goal of decommissioning is to restore the turbine site to the physical condition of the land as it existed prior to development of the wind project. As demonstrated through the decommissioning procedures, the decommissioning of wind projects consists primarily of equipment removal and soil restoration. Despite the paucity of data concerning the effectiveness of wind project decommissioning, wind projects generally have a higher minimum bond requirement than O&G projects creating a greater likelihood that decommissioning will restore the land to its prior condition.<sup>65</sup>

#### **D. Comparison of Federal O&G Extraction Site and Wind Project Decommissioning Regulations**

Beyond the basic regulatory minimum bond amounts for O&G and wind projects, it is also useful to compare the bond amounts versus the actual cost of decommissioning. Reclamation cost data for O&G sites is scarce. As previously reported, the BLM spent \$3.8 million reclaiming 295

orphaned wells between 1998 and 2009.<sup>66</sup> Accordingly, based on these figures, the average *actual* reclamation cost of these wells can be assumed to be approximately \$13,000 per well. The Pennsylvania Department of Environmental Protection (DEP) reported the average cost of plugging a well and restoring the site averaged \$60,000 per well.<sup>67</sup> Some reports estimate reclamation costs of up \$100,000 per well.<sup>68</sup> **Figure 1** shows these reclamation costs and the *minimum* BLM bonding requirements normalized (divided) by the land use values reported in **Table 1**. In **Figure 1**, the minimum O&G bond is \$10,000 per independent well.<sup>69</sup>

**A** review of permit applications for different wind farms illustrates decommissioning cost estimates ranging between \$11,000 and \$50,000 per turbine.<sup>71</sup> **Figure 1** also depicts the normalized minimum bonding requirements compared to the actual decommissioning costs for wind turbines. This comparison demonstrates that, albeit significant uncertainty about the actual decommissioning and restoration costs, the current



**Figure 1:** Normalized Minimum Bonding Requirements and Reclamation/Decommissioning Costs<sup>70</sup>

bonding requirements for wind will also likely be insufficient.

Although both O&G operations and wind project operations have seen a substantial increase in recent years, the regulatory structures governing O&G and wind development have not similarly developed.<sup>72</sup> While the BLM has promulgated recent guidelines, policies, and bonding requirements for wind development decommissioning, it has not updated O&G minimum bonds since the 1950s and 1960s. Consequently, regulations for projects on federal public lands impose a greater burden on wind energy projects than O&G extraction activities. Furthermore, notwithstanding the greater regulatory burden on wind projects, it is evident that current bonding requirements for wind and O&G development foster inadequate environmental protection, as the required bonds

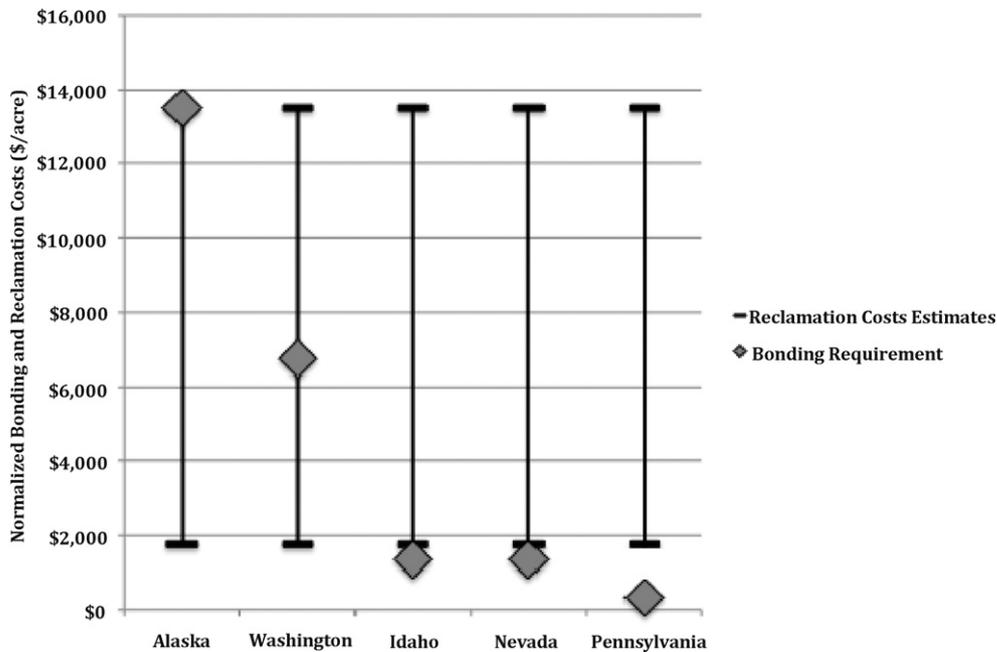
will not likely cover the full costs of reclamation and decommissioning.

#### IV. Decommissioning Regulations on State Land

##### A. State O&G extraction site decommissioning regulations

States regulate O&G extraction site operations through several state authorities and mechanisms.<sup>73</sup> The 12 western states in which the majority of oil and gas production occurs provide particularly illustrative examples of how state oil and gas bonding requirements differ from the BLM's bonding requirements on federal lands.<sup>74</sup> Many of these states determine the bond amount based on characteristics of the well—well depth or total number of wells covered by the bond.<sup>75</sup> Alternatively, states that set bond amounts by a regulatory

minimum generally have minimum bond amounts that are at least equal to or higher than BLM's minimum bond.<sup>76</sup> States have three types of bonds: *statewide blanket bonds* which cover all the operator's wells in the state, *blanket bonds* which cover multiple wells in the state, or an *individual well bond*.<sup>77</sup> Of the states that set individual well minimum bonds by regulation, some greatly exceed the BLM minimum. For example, Alaska and Washington require \$100,000 and \$50,000 per well, respectively. However, Idaho and Nevada require a \$10,000 individual bond per well, equal to the BLM regulatory minimum.<sup>78</sup> Some states require minimum bonds that are less than the federal minimum. For example, in Pennsylvania, the bond amount for a single well is \$2,500.<sup>79</sup> Some states require minimum statewide bonds regardless of a well's characteristics—these



**Figure 2:** O&G State Bonding and Reclamation Cost Comparison

include Alaska, Idaho, Montana, Nevada, New Mexico, Pennsylvania, Washington, and Wyoming. These states have a regulatory minimum greater than the BLM’s \$25,000 bond per well, except for Idaho, which has an equal minimum bonding requirement.<sup>80,81</sup>

Figure 2 shows the normalized bonding requirement for individual wells and reclamation costs for particular states. Alaska’s bonding requirements closely resemble actual reclamation costs. Conversely, Pennsylvania’s bonding requirements are demonstrably inadequate.<sup>68</sup>

### B. State wind decommissioning regulations

Currently, relatively few states have decommissioning and bond requirements for wind energy projects. The states that do impose

decommissioning requirements and bonds rely on various mechanisms to implement decommissioning requirements. While a more comprehensive list of state decommissioning requirements is set out in Table A1 in Appendix A, a few of the more illustrative requirements are analyzed here. In Minnesota, a state statute requires the public utilities commission (PUC) to develop rules to govern the site restoration of large wind energy projects, called large wind energy conversion systems (LWECS).<sup>82</sup> Accordingly, the Minnesota PUC promulgated regulations for decommissioning and restoration requirements, including the mandatory assurance from wind developers that funds will be available for decommissioning and restoration.<sup>83</sup>

Alternatively, some states—like Vermont and Indiana—condition approval of

renewable energy facilities on the establishment of a decommissioning plan and financial assurance. In order to be approved by the state utility regulatory body in Vermont, the Vermont Public Service Board (PSB), energy facilities must receive a “certificate of public good.”<sup>84</sup> The PSB has consistently conditioned a certificate of public good on a facility’s decommissioning plan, which must include a detailed cost estimate of decommissioning, as well as a mechanism to guarantee a secured fund to be available when decommissioning is necessary.<sup>85</sup> Similarly, in Indiana, the Utility Regulatory Commission requires facilities to establish a decommissioning plan that includes a financial assurance equal to the estimated amount for demolition and removal costs.<sup>86</sup> The plan must be secured through the form of a bond, letter, or

credit, or other acceptable guarantee.<sup>87</sup> The decommissioning plan is developed and approved through the renewable energy project's review and approval.<sup>88</sup>

Other states govern the decommissioning of renewable energy facilities through energy facility siting evaluation committees. Although these committees vary greatly depending on the state enabling statute, the purpose of an energy facility siting evaluation committee is to create a state-sponsored entity to review and oversee large energy facilities and infrastructure.<sup>89</sup> In Oregon, the Oregon Energy Facility Siting Council (OREFSC) has broad public interest authority, including the authority to impose decommissioning standards on any facility within its jurisdiction through the site certification process.<sup>90</sup> Under this authority, the OREFSC developed requirements for retirement and financial assurances for decommissioning facilities.<sup>91</sup> Accordingly, in order to be granted a site certificate to construct a facility, an applicant must detail its proposal for site restoration and costs, the OREFSC reviews the plan and cost estimate, sets a required fund for decommissioning, and then requires a bond or letter of credit to be established before the applicant can begin construction.<sup>92</sup>

In other states, like South

Dakota, local ordinances regulate the decommissioning procedures of wind projects under a specified nameplate capacity (i.e., 100 MW).<sup>93</sup> In South Dakota, the Public Utilities Commission requires decommissioning plans, cost estimates, and *may* require a bond or other guarantee for wind farms over 100 MW.<sup>94</sup> If the wind project does not exceed 100 MW, city and county ordinances are



often passed to impose permitting requirements.<sup>95</sup>

However, state decommissioning regulations are not common. A review of state decommissioning requirements reveals that only a few states have requirements for decommissioning wind projects, or renewable energy projects more generally. Of the states that do impose requirements on wind energy developers, the requirements are not standardized and are assessed on a case-by-case basis. Unlike decommissioning requirements on federal land, there is no generally adopted minimum bonding requirements for developments on state lands. For

more information, see [Appendix A](#).

### C. Comparison of state O&G extraction site and wind project decommissioning regulations

Generally, although state O&G extraction site decommissioning regulations impose greater bonding requirements than federal regulations for O&G decommissioning, the bonding requirements are still insufficient to meet the actual costs of decommissioning. Additionally, although, state O&G extraction site decommissioning regulations appear to be more widely adopted across states that decommissioning regulations for wind turbines, the required state wind decommissioning bonds are expected to adequately meet the actual costs of decommissioning. Under state wind decommissioning regulations, all bonds and financial assurances are set on a case-by-case basis. Consequently, decommissioning bonding requirements are likely more reflective of the actual costs of project decommissioning and site reclamation.

## V. Decommissioning Regulations at the County Level

Many counties throughout the United States have enacted ordinances to regulate the development of wind energy resources on local lands. [Table B1](#)

in Appendix B, though not exhaustive, provides a sample of county wind ordinances across the country. A survey of these ordinances reveals that most ordinances include language that, in effect, requires a secure financial assurance for the costs of decommissioning and reclaiming a site.<sup>96</sup> Although the ordinances do not specify particular financial amounts, they generally provide that the decommissioning funds be adequate for the full cost of decommissioning and require approval by the appropriate county, town, or regulatory authority.<sup>97</sup> Thus, decommissioning requirements and financial securities are approved on a case-by-case basis.

For example, in Vermilion County, Ill., a wind energy project was approved with the contractual obligation that the developer was responsible for the full costs of decommissioning the project—an estimated \$98,000 per turbine.<sup>98</sup>

Conversely, county ordinances for oil and gas wells are not as widespread. Again, though not an exhaustive review, county ordinances regulating O&G

operations generally supplement federal and state regulations and do not include specific language or requirements for decommissioning O&G wells on local land.<sup>99</sup>

Wind projects on county land have likely caught the attention of local regulators because of the recentness of wind energy development and the lack of a longstanding regulatory regime. Without complete details on decommissioning funding requirements for wind or O&G resources at the county level, a quantitative analysis of the effect and implication of these ordinances cannot be undertaken.

## VI. Electricity Generation Potential

Although the paramount concern with decommissioning regulations centers around the environmental impacts associated with inadequately restored sites, it is also useful to note the differences in electricity generation potential between wind turbines and natural gas wells. Although the electricity

generation potential of a specific natural gas well or wind turbine is highly dependent on the project, a natural gas well generally provides energy that can be turned into more electricity over the lifetime of the well compared to a wind turbine. Thus, although wind turbines may have more stringent bonding requirements than natural gas wells, more wind turbines are required to produce the same amount of electricity as a natural gas well produces.

Table 4 shows lifetime electricity generation estimates assuming different project lifetimes, average lifetime gas generation rates, and wind capacity factors. These numbers assume a 2 MW turbine and a natural gas power plant efficiency of 50 percent. These values are highly dependent on the specific project and site so a generalized comparison of these values is not appropriate. As an example, however, the normalized BLM bonding requirement for a well that produces natural gas for 30 years at a rate of 0.2 MMcf/day is roughly \$4,000/acre-TWh of electricity generated. The restoration costs for this well

**Table 4:** Lifetime Electricity Generation for Wind Turbines and Natural Gas (MWh/Project Lifetime)<sup>a</sup>

Project Lifetime (yr)	Average Lifetime Production Rate for					
	Vertical Well (MMcf/day)			Wind Turbine Capacity Factor		
	0.05	0.1	0.2	0.15	0.25	0.4
10	28,000	55,000	110,000	26,000	44,000	70,000
20	55,000	110,000	220,000	53,000	88,000	140,000
30	83,000	165,000	330,000	79,000	130,000	210,000

<sup>a</sup> Average lifetime production rate for vertical wells was chosen based on average production rates for natural gas wells between 1989 and 2009. Production of natural gas declines over the years. In this analysis, however, we are interested in total production, so an average number for the entire well lifetime is appropriate. A heat rate of 6,828 Btu/kWh was used for the natural gas plant. See U.S. ENERGY INFO. ADMIN., Natural Gas: Number of Production Wells (Nov. 29, 2011), at [http://www.eia.gov/dnav/ng/ng\\_prod\\_wells\\_s1\\_a.htm](http://www.eia.gov/dnav/ng/ng_prod_wells_s1_a.htm); U.S. Energy Info. Admin., Natural Gas: Natural Gas Gross Withdrawals and Production (Nov. 29, 2011), at [http://www.eia.gov/dnav/ng/ng\\_prod\\_sum\\_dcu\\_NUS\\_a.htm](http://www.eia.gov/dnav/ng/ng_prod_sum_dcu_NUS_a.htm).

could be as high as \$40,000/acre-TWh. For a wind turbine with a 30-year lifetime and a capacity factor of 40 percent, the normalized bonding requirement is roughly \$25,000/acre-TWh, while the decommissioning cost can be as high as \$125,000/acre-TWh. Thus, while the bond required for the wind farm accounts for 20 percent of the normalized decommissioning costs, the bond for the O&G well accounts for only 10 percent of the reclamation costs.

## VII. Conclusions

A comparison of federal, state, and county decommissioning regulations for O&G extraction sites and wind energy projects reveals that, generally, regulatory requirements are wholly insufficient to adequately secure the costs of decommissioning.

At both the federal and state level, agencies have enacted decommissioning regulations for O&G activities.

However, it is evident that the bonding requirements imposed by the regulations are insufficient. The federal government has also enacted federal regulations for decommissioning requirements and minimum bond securities for wind projects on federal lands. However, few states have developed decommissioning regulations for wind facilities. Regulatory bonding requirements for wind projects on federal lands, although established more recently than the O&G bonding requirements, also seem to be insufficient. However, the states which have established decommissioning regulations for wind projects require bonding amounts on a case-by-case basis. Evaluating decommissioning bonding requirements on a case-by-case basis will most likely produce more accurate bond amounts. Consequently, state decommissioning requirements may potentially serve as a useful regulatory model for establishing adequate decommissioning requirements.

Lastly, although both O&G and wind decommissioning regulations are insufficient to cover the actual costs of decommissioning, it is important to note the disparity in the regulatory requirements. In order to adequately integrate renewable energy, the policy environment must ensure that wind projects are constructed, operated, and retired in an environmentally sensitive manner, and that the cost of doing so does not disproportionately disadvantage the facilitation of renewable energy. Accordingly, equitable regulatory burdens are necessary for all energy activities so that each resource is subject to environmental accountability and proportional regulatory burdens. Creating a level playing field amongst energy resources is imperative so that resource selection amongst competing resources is not disproportionately burdened by differences or inadequacies in regulatory systems.

## Appendix A

**Table A1: State Decommissioning Regulations**

	Renewable Facility Decommissioning Rules/Fund	Type/Notes
Alabama	No	–
Arizona	No	–
Arkansas	No	–
California	No	Have general facility closure requirements for energy facility licensing, but no bond. Cal. Pub. Res. Code § 25532 (2010).
Colorado	No	–
Delaware	No	–

Table A1 (Continued)

	Renewable Facility Decommissioning Rules/Fund	Type/Notes
Florida	No	–
Georgia	No	–
Hawaii	Yes	Decommissioning rules, but no fund requirements. Hawaii Rev. Stat. § 269-1(G).
Idaho	No	–
Iowa	No	–
Indiana	Yes	Decommissioning rules and funds for wind projects. Indiana Utility Regulation Commission, Order No. 43602; Order No. 43759; Order No. 43678.
Kansas	No	Only local ordinances.
Massachusetts	No	Generally, decommissioning procedures are established within specific agreements between developers and site owners.
Maine	Yes	Me. Rev. Stat. tit. 38, § 481–490. In pertinent part, § 490 (2), “ <b>Bonds.</b> The department may require a bond payable to the State with sureties satisfactory to the department or such other security as the department may determine will adequately secure compliance with this chapter, conditioned upon the faithful performance of the requirements set forth in this chapter and of the rules of the board.”  <i>See also, Spruce Mountain Wind Project Maine DEP Site Location of Development Act Permit Application, Section 29 (Jan. 21, 2010).</i>
Michigan	No	–
Minnesota	Yes	MINN. STAT. § 216F.05; MN ADC 7854.0500, Subpart 13.
Montana	No	–
New Mexico	No	–
New York	Yes, if over 80 MW nameplate capacity.	Municipal ordinances if below 80 MW; otherwise under Public Service Law Article X certification requirements (expired 2003).
North Dakota	Yes	Decommissioning of commercial wind energy facilities. N.D. Admin. Code §§ 69-09-09-06, 69-09-09-07 (2008).
Ohio	Yes, if over 5 MW nameplate capacity.	Public Utility Commission of Ohio requires plan for decommissioning and discussion of financial arrangements designed to assure requisite financials to carry out the plan. Ohio Admin. Code Chapter 4906-17.
Oregon	Yes	Under jurisdiction of Energy Facility Siting Board which estimates costs of restoration and mandates bond or letter of credit as financial security for site restoration.
South Dakota	Yes, if over 100 MW nameplate capacity.	PUC encourages use of local ordinances based on draft model if rated under 100 MW.
Texas	No	–
Virginia	No	DEQ regulations may apply.
Vermont	Yes	Condition for Public Service Board approval of Certificate of Public Good under 30 V.S.A. §248 which establishes requirements for in-state electric transmission and generation construction projects. See <i>Order Re Lease Language, Decommissioning Plan, and Request for Hearing, Docket No. 7156 (2007)</i> .

Source: *Decommissioning Funds for Renewable Energy Facilities*, Danielle Changala and Jonathan Voegele, Vermont Law School Institute for Energy and the Environment (2010), Presented at First Integration and Policy Workshop for the RenewElec Project, Oct. 21–22, 2010, Carnegie Mellon University, Pittsburgh.

## Appendix B

**Table B1:** County Wind Decommissioning Ordinances

County	State	Ordinance	Enacted In	Requires	Project Examples
Chautauqua	NY	County requires “Draft Environmental Impact Statement” Available at: <a href="http://www.ripleywestfieldwind.ene.com/files/EIS/Appendix%20F%20-%20Decommissioning%20Plan.pdf">http://www.ripleywestfieldwind.ene.com/files/EIS/Appendix%20F%20-%20Decommissioning%20Plan.pdf</a>	2010	Requires a financial security in the form of a letter of credit, a bond, or cash. Amount of financial security will be in an amount sufficient to adequately perform the required decommissioning pursuant to local, state, and federal environmental regulations. The amount of the financial assurance can be modified to reflect changes in the decommissioning costs or salvage value of the project equipment.	Ripley-Westfield Wind Farm <sup>a</sup> (2009). Estimated decommissioning cost per turbine to be \$64,680.
Clay	MN	Clay County Wind Ordinance No. 2009-2	2009	Requires a decommissioning plan, which includes the decommissioning costs—determined by a competent party—and identifies the financial resources which will be used to fund the decommissioning.	
Fillmore	MN	Wind Energy Conversion System Ordinance Available at: <a href="http://www.co.fillmore.mn.us/zoning/documents/2008wind_energy_conversion_systems_ord.pdf">http://www.co.fillmore.mn.us/zoning/documents/2008wind_energy_conversion_systems_ord.pdf</a>	2007	Requires each commercial wind energy conversion system (WECS) to have a decommissioning plan that details the anticipated means and cost of decommissioning the project. The cost estimate should be made by a person with competent expertise or experience with decommissioning. The decommissioning plan should also identify the financial resources that will be available to pay for the project's decommissioning.	
Hyde County	NC	Hyde County Ordinance 2008-10-01	2008		—
Huron	MI	Huron County Wind Energy Conversion Facility Overlay Zoning Ordinance  Available at: <a href="http://www.deq.state.mi.us/documents/deq-ess-p2-agp2-ArticleIII(Revised).pdf">http://www.deq.state.mi.us/documents/deq-ess-p2-agp2-ArticleIII(Revised).pdf</a>	2010	Requires a performance bond or equivalent financial instrument at an amount determined by the County to be used for decommissioning and site restoration.	—

Table B1 (Continued)

County	State	Ordinance	Enacted In	Requires	Project Examples
Pike County	IL	Available at: <a href="http://suretybond.ca/news/Article.aspx?id=176643&amp;page=windfarm-surety-bond-will-ensure-eventual-decommissioning-176643">http://suretybond.ca/news/Article.aspx?id=176643&amp;page=windfarm-surety-bond-will-ensure-eventual-decommissioning-176643</a>	2011	Requires a financial assurance equal to 20% of the total project decommissioning cost in years 1–4 of operation; the level rises each year until it reaches 100% of decommissioning costs for years 17–20 of operation. Licensee reassesses project decommissioning costs at years 8, 16, 20 and every consecutive year thereafter.	Affinity Wind Farm; first project phase to be constructed at end of 2011. <sup>b</sup>
Riley County	KS	County Regulations for Wind Energy Conversion Systems, Special Uses, Section 22 Available at: <a href="http://www.rileycountyks.gov/documents/Planning%20and%20Development/Zoning%20Regulations/y)%20Section%2022%20-%20Special%20Uses.pdf">http://www.rileycountyks.gov/documents/Planning%20and%20Development/Zoning%20Regulations/y)%20Section%2022%20-%20Special%20Uses.pdf</a>	2006	Requires a security assurance, in the form of a letter of credit, a cash escrow account, a performance bond, or other form of security acceptable to the County, to be used to pay the costs of decommissioning and site reclamation. The financial security should equal 100% of the estimated decommissioning and reclamation costs, and shall provide for an annual adjustment based on inflation.	–
Redwood	MN	Redwood County Zoning Ordinance, Section 19, Wind Power Management Available at: <a href="http://www.co.redwood.mn.us/Zoning_Ordinance/SECTION%2019%20WINDPOWER%20MANAGEMENT.pdf">http://www.co.redwood.mn.us/Zoning_Ordinance/SECTION%2019%20WINDPOWER%20MANAGEMENT.pdf</a>	2009	Decommissioning plan must include how the decommissioning costs will be covered; applicants may be required to establish an escrow account to fund the decommissioning costs. Decommissioning plan must include the estimated costs of decommissioning.	–
Shawano	WI	Wind Energy Conversion System Ordinance Available at: <a href="http://www.co.shawano.wi.us/departments/page_aa67df910805/?department=c61420c5769b&amp;subdepartment=05e3b7e00867">http://www.co.shawano.wi.us/departments/page_aa67df910805/?department=c61420c5769b&amp;subdepartment=05e3b7e00867</a> (follow “Wind Energy Conversion System”).	2005	Developer must provide a financial security to insure decommissioning and removal of the facility.	–
Solano	CA	Solano County Zoning Ordinance; Wind Turbine Siting Plan Available at: <a href="http://www.co.solano.ca.us/civicax/filebank/blobdload.aspx?blobid=5369">http://www.co.solano.ca.us/civicax/filebank/blobdload.aspx?blobid=5369</a>	1987	Liens, surety bonds or other security may be required as part or condition of any wind turbine generator project.	Montezuma Wind Plant Project <sup>c</sup>

Table B1 (Continued)

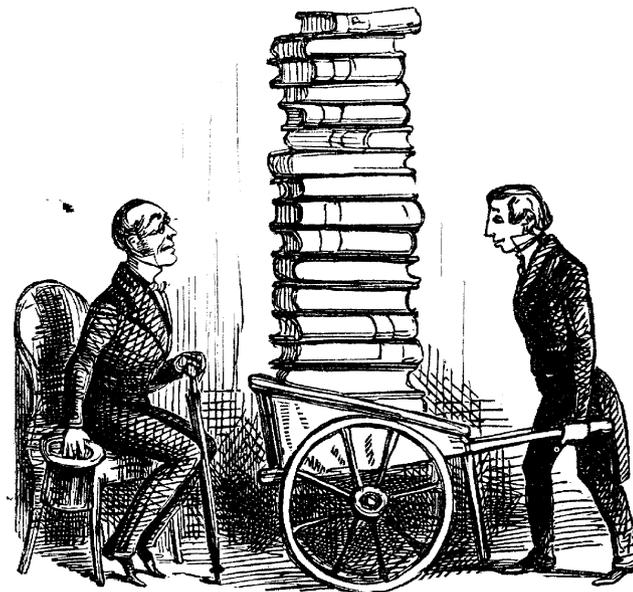
County	State	Ordinance	Enacted In	Requires	Project Examples
Vermilion	IL	Vermilion County Wind Energy Structure Ordinance, Ordinance No. 09-0102. Available at: <a href="http://www.vercounty.org/ctybrd/Vermilion%20County%20-%20California%20Ridge%20wind%20project%20building%20permit%20application.pdf">http://www.vercounty.org/ctybrd/Vermilion%20County%20-%20California%20Ridge%20wind%20project%20building%20permit%20application.pdf</a>	2009	A secure financial assurance of a reasonable amount agreed to by the relevant parties.	California Ridge Wind Energy Project; included a contractual agreement to cover cost of decommission equivalent to \$98,000 per turbine.

This is not an exhaustive survey of county wind ordinances; it is provided to illustrate and highlight common language and requirements found throughout many county wind ordinances.

<sup>a</sup> *Decommissioning Plan*, Ripley-Westfield Wind Farm, at <http://www.ripleywestfieldwind.ene.com/files/EIS/Appendix%20F%20-%20Decommissioning%20Plan.pdf> (2009).

<sup>b</sup> *Pike County Requires Surety Bond from Wind Farm Developers*, WHIG.COM (Sept. 1, 2011), at <http://suretybond.ca/news/Article.aspx?id=176643&page=windfarm-surety-bond-will-ensure-eventual-decommissioning-176643>.

<sup>c</sup> *See Amendment Final Environmental Impact Report, Montezuma Wind Plant Project (U-06-06)*, at <http://www.co.solano.ca.us/civicax/filebank/blobdload.aspx?blobid=7860> (2010).



*A comparison of federal, state, and county decommissioning regulations reveals that, generally, regulatory requirements are wholly insufficient to adequately secure the costs of decommissioning.*

**Endnotes:**

1. Comparisons of other energy resources like uranium mining, coal mining, solar projects, etc., could also provide useful comparisons and could be analyzed in subsequent research.

2. U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-10-245, OIL AND GAS BONDS: BONDING REQUIREMENTS AND BLM

EXPENDITURES TO RECLAIM ORPHANED WELLS, 6 (2010); U.S. DEP'T OF THE INTERIOR BUREAU OF LAND MGMT., FES 05-11, FINAL PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT ON WIND ENERGY DEVELOPMENT ON BLM-ADMINISTERED LANDS IN THE WESTERN UNITED STATES, 3-2 (2005).

3. OIL AND GAS BONDS, *supra* note 2, at 6.

4. *Id.*

5. U.S. DEP'T OF THE INTERIOR BUREAU OF LAND MGMT., FES 05-11, FINAL PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT ON WIND ENERGY DEVELOPMENT ON BLM-ADMINISTERED LANDS IN THE WESTERN UNITED STATES, 3-2 (2005).

6. *Id.*

7. See Nels Johnson, *Pennsylvania Energy Impact Assessment* (Nov. 15,

- 2010), at [http://www.nature.org/media/pa/pa\\_energy\\_assessment\\_report.pdf](http://www.nature.org/media/pa/pa_energy_assessment_report.pdf) (estimating land use impacts of wind turbines by using digitalized aerial images of wind development areas before and after wind turbine installation. The Nature Conservancy analyzed roughly 320 turbines in 12 sites across the state of Pennsylvania.).
8. Sarah M. Jordaan, David W. Keith and Brad Stelfox, *Quantifying land use of oil sands production: a life cycle perspective*, ENVIRON. RES. LETT. 4 (2009).
9. *Id.*
10. U.S. Dep't of the Interior Bureau of Land Mgmt., *BLM Fact Sheet: Renewable Energy and the BLM*, at [http://www.blm.gov/pgdata/etc/medialib/blm/wo/MINERALS\\_REALTY\\_AND\\_RESOURCE\\_PROTECTION/energy/renewable\\_references.Par.95879.File.dat/2010%20Renewable%20Energy%20headed.pdf](http://www.blm.gov/pgdata/etc/medialib/blm/wo/MINERALS_REALTY_AND_RESOURCE_PROTECTION/energy/renewable_references.Par.95879.File.dat/2010%20Renewable%20Energy%20headed.pdf).
11. FINAL PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT ON WIND ENERGY DEVELOPMENT, *supra* note 5, at 4–33.
12. OIL AND GAS BONDS, *supra* note 2, at 22–23.
13. *Id.* at 10.
14. FEDERAL LANDS MGMT. POLICY ACT OF 1976, 43 U.S.C. § 1732(a)–(b) (2006).
15. *Id.* at § 1701 et seq.
16. U.S. DEP'T OF THE INTERIOR BUREAU OF LAND MGMT., 135 DM 1, DEP'T MANUAL (effective Sept. 20, 2007).
17. OIL AND GAS BONDS, *supra* note 2, at 1.
18. *Id.*
19. 43 C.F.R. § 3160–3165; U.S. DEP'T OF THE INTERIOR BUREAU OF LAND MGMT., IM 2009-043, WIND ENERGY DEVELOPMENT POLICY, 9 (2008).
20. 43 U.S.C. § 1730 et seq.; WIND ENERGY DEVELOPMENT POLICY, *supra* note 19, at 9.
21. OIL AND GAS BONDS, *supra* note 2, at 11.
22. 43 C.F.R. §§ 3160–3162; OIL AND GAS BONDS, *supra* note 2, at 1.
23. *Id.* at 6.
24. *Id.*
25. OIL AND GAS BONDS, *supra* note 2, at 7.
26. *Id.*
27. *Id.*
28. *Id.*
29. *Id.*
30. *Id.* at 8.
31. *Id.* at 12.
32. *Id.*
33. *Id.* at 13.
34. *Id.*
35. *Id.*
36. *Id.*
37. *Id.*
38. *Id.*
39. *Id.*
40. *Id.*
41. *Id.* at 8–9.
42. *Id.* at 9.
43. *Id.* at 16.
44. The \$162 million figure reflects the total amount secured in bonds. A well can only access the bond secured for its individual project. *Id.* at 10.
45. *Id.*
46. *Id.*
47. WIND ENERGY DEVELOPMENT POLICY, *supra* note 20, at 1.
48. 43 C.F.R. § 2800.
49. 43 C.F.R. § 2803.23(c).
50. WIND ENERGY DEVELOPMENT POLICY, *supra* note 20, at 9.
51. *Id.* at 7.
52. *Id.* at 7–8. The annual rental fee is equal to the anticipated total installed capacity in kilowatts on public lands as identified in the approved plan of development (POD) multiplied by 8,760 hours per year multiplied by a 30% capacity factor multiplied by 5.27% federal rate of return multiplied by \$0.03 average price per kilowatt.
53. *BLM Fact Sheet*, *supra* note 11.
54. *Id.*
55. WIND ENERGY DEVELOPMENT POLICY, *supra* note 20, at 5; 43 C.F.R. 2804.12(a)(5); 43 C.F.R. 2804.24(a)(5).
56. *Id.*
57. *Id.* at 8. The minimum bonding amount of a wind turbine has been updated since the BLM's 2006 Wind Energy Development Policy, where the bonding requirement was \$2,500/per turbine. See generally WIND ENERGY DEVELOPMENT POLICY, *supra* note 20.
58. WIND ENERGY DEVELOPMENT POLICY, *supra* note 20, at 8.
59. *Id.*
60. *Id.*
61. *Id.*
62. U.S. Dep't of the Interior, *BLM Wind Energy Program Policies and Best Mgmt. Practices*, Attachment 1–19 (2009).
63. N.D. CENT. CODE § 28-32-02; 49-02-27 (2008).
64. *Id.*; South Dakota Permit Requirements, Docket No. EL08-031, at: <http://puc.sd.gov/commission/dockets/electric/2008/el08-031/Appendix%20h.pdf> (2008).
65. WIND ENERGY AMERICA, *Frequently Asked Questions*, at <http://www.windenergyamerica.com/faqs.html>.
66. *Id.* at 16.
67. Austin L. Mitchell and Elizabeth Casman, *Economic Incentives and Regulatory Framework for Shale Gas Well Site Reclamation in Pennsylvania* (2011), ENVTL. SCI. & TECH., 45 (22) at 9506–9514.
68. Matt Andersen, Roger Coupal and Bridgette White, *Reclamation Costs and Regulation of Oil and Gas Development with Application to Wyoming*, Western Economics Forum (2009), at <http://ageconsearch.umn.edu/bitstream/92846/2/0801005.pdf>.
69. See Table 3.

70. Reclamation costs and the minimum BLM bonding requirements were normalized by dividing them by the land use values reported in Table 1.

71. Hounsfield Wind Farm: Decommissioning Plan (Aug. 12, 2008), at [http://www.dec.ny.gov/docs/permits\\_ej\\_operations\\_pdf/hnsfldappendixu.pdf](http://www.dec.ny.gov/docs/permits_ej_operations_pdf/hnsfldappendixu.pdf); Record Hill Wind Project: Decommissioning Plan (2009), at [http://www.maine.gov/dep/blwq/docstand/sitelaw/Selected%20developments/Record\\_Hill/Section%2029%20Decommissioning%20Plan.pdf](http://www.maine.gov/dep/blwq/docstand/sitelaw/Selected%20developments/Record_Hill/Section%2029%20Decommissioning%20Plan.pdf); Buffalo Ridge II Wind Farm: Decommissioning Plan (Oct. 2008), at <http://puc.sd.gov/commission/dockets/electric/2008/el08-031/Appendix%20h.pdf>. These estimates include a credit for the scrap steel that can be recovered from the turbine.

72. From 1988 to 2008, the number of O&G wells on federal lands increased from almost 50,000 wells to 85,000 wells—with the increase occurring primarily in the last decade. OIL AND GAS BONDS, *supra* note 2, at 11.

73. See National Energy Technology Laboratory, *Protecting Our Country's Resources: The States' Case*, 27–61 (2008), at <http://iogcc.publishpath.com/Websites/iogcc/pdfs/2008-Protecting-Our-Country's-Resources-The-States'-Case.pdf>.

74. OIL AND GAS BONDS, *supra* note 2, at 20.

75. *Id.* at 20–21.

76. *Id.* at 23.

77. *Id.* at 20.

78. *Id.* at 23.

79. Although it is important to note Pennsylvania's statewide minimum bond is \$25,000 which is equal to the federal minimum bonding amount. COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION, *Oil and Gas Well Drilling and Production in Pennsylvania*, at <http://www.columbiacountyema.org/Oil%20%20&%20Gas%20Wells.pdf> (2007).

80. *Id.*

81. The costs presented in the y-axis have been normalized (divided) by

the land use estimates reported in Table 1.

82. MINN. STAT. ANN. § 216F.05 (2008).

83. MINN. R. 7854.0500, Subpart 13. Neither the statute or regulations specify what method must be employed to ensure adequate funds for decommissioning, just that the developer ensure that adequate funds be available. In Commission review, the commission requires only “[t]he owner will be responsible for costs to decommission the project and associated facilities.” *In the Matter of the Site Permit Application for a 20 Megawatt Large Wind Energy Conversion System in Stevens County, Minnesota*, NO. IP-6824, 2010 WL 750957 (Minn. PUC 2010).

84. 30 V.S.A §248.

85. *Order Re Lease Language, Decommissioning Plan, and Request for Hearings*, Docket No. 7156 (VT PSB Aug. 8, 2007); see also *Order Re Lease Language, Decommissioning Plan, and Request for Hearings*, Docket No. 7156 (VT PSB May 14, 2008) (finding that the applicant's “revisions to its decommissioning plan adequately address the issues that the Department had previously raised regarding the plan: the revised plan includes an appropriate adjustment for inflation; it provides for full decommissioning of the substation; and it includes as a reporting mechanism the requirement that UPC file with the Board the project's annual energy production as reported to ISO-New England.”).

86. In the Matter of the Petition by Meadow Lake Wind Farm LLC, Docket No. 43602 (Indiana Utility Regulatory Comm'n 2008); In the Matter of the Petition by Meadow Lake Wind Farm III LLC, Docket No. 43759 (Indiana Utility Regulatory Comm'n 2009); In the Matter of the Petition by Meadow Lake Wind Farm II LLC, Docket No. 43678 (Indiana Utility Regulatory Comm'n 2009).

87. *Id.*

88. *Id.*

89. Although they vary, EFSECs are typically one-stop licensing committees consisting of

representatives from various regulatory agencies, public citizens and governor appointees. EFSECs are typically responsible for reviewing conventional thermal power plants, pipelines and storage facilities, transmission lines, and renewable generation projects which meet a certain capacity.

90. See OR. ADMIN. R. 345-022-0050; OREFSC jurisdiction for renewables includes any geothermal, solar, or wind project of 35 MW or more.

91. *Id.*

92. OR. ADMIN. R. 345-022-0050(1); The OREFSC's determination is a case-by-case factual evaluation.

93. S.D. CODIFIED LAWS § 49-41B-2 (5), (6), (12).

94. S.D. ADMIN. R. 20:10:22:33, 33.01, and 33.02.

95. See, e.g., S.D. Public Utilities Comm'n, Model Ordinance for Siting of Wind Energy Systems (WES) Overview, at <http://puc.sd.gov/commission/twg/WindEnergyOrdinanceoverview.pdf>.

96. See Appendix B.

97. See, e.g., Ripley Westfield Wind Decommissioning Plan, at <http://www.ripleywestfieldwind.ene.com/files/EIS/Appendix%20F%20-%20Decommissioning%20Plan.pdf> (2009) (“Any bond or letter of credit will be in a form reasonably acceptable to the Towns and issued by an institution reasonably acceptable to the Towns. . . The financial security will be in an amount sufficient to adequately perform the required decommissioning per this plan and all local, state and federal environmental regulations.”).

98. Vermilion County Wind Energy Structure Ordinance Building Permit Application, California Ridge Wind Energy Project, Section 4.3.6 *Decommissioning and Restoration*, at <http://www.vercounty.org/ctybrd/Vermilion%20County%20-%20California%20Ridge%20wind%20project%20building%20permit%20application.pdf> (2011).

99. *Id.*